

4.2 Bubble Chamber CF₃I Drain Procedure

This procedure covers the removal of CF₃I from the bubble chamber inner vessel.

- 1) Review procedure “3 CF₃I Handling Procedure”.
- 2) Ensure that the hydraulic system is appropriately initialized. It should be pressurized, with the inner vessel near full extension. Its temperature should be between 20°C and 30°C .
- 3) Ensure that the CF₃I transfer bottle is sufficiently large to contain all the CF₃I to be drained.
- 4) Assemble the CF₃I transfer lines, and vacuum pump. If the CF₃I transfer bottle does not contain residue, connect it. An empty CF₃I bottle is preferred when the cleanliness of the gas and inner vessel must be maintained. The plumbing consists of a flexible connection from the main Cartan valve (MV-22) to the CF₃I transfer bottle. The line is equipped with a tee to a vacuum pump down line with an isolation valve. The pump down port should be near MV-22. Place the CF₃I transfer bottle in a cooling bath of either ice water or chilled water.
- 5) Follow the “Before Handling CF₃I” section of procedure 3. Leak check the transfer line and don PPE.
- 6) If the CF₃I bottle is empty, open the port to the transfer bottle. If the CF₃I bottle contains residue, it should not yet be connected. Turn on the vacuum pump, open the plumbing to the vacuum pump and evacuate the CF₃I transfer lines and bottle (if applicable).
- 7) Ensure that you have the “Commissioning Tool” VI operating. This software will provide access to and logging of all of the state variable data for the chamber, the CF₃I mass transfer data, the control and read-back data from the hydraulic cart and the heater/chiller unit, and photography data for the inner vessel.
- 8) Initiate data logging every 5 seconds.
- 9) Use the hydraulic piston position controls to drive the fast piston down to near its bottom stop and to extend the bellows. Be very careful not to overextend the bellows.
- 10) Close the valve to the isolate the vacuum pump and turn off the vacuum pump.
- 11) Verify that the vacuum pump line is closed. If the CF₃I transfer bottle is not connected, connect it and slowly open the valve to it.

4.2 Bubble Chamber CF₃I Fill Procedure

Written Procedure

- 12) Very slowly open MV-22 to initiate the distillation. Over 80psi of pressure will now fill the line. The CF₃I will boil through the water. Make sure that the inner vessel does not crash against it's upper stop. If it moves hard towards the stop, **DO NOT adjust the hydraulic piston position**. Close MV-22 slowly and stop the distillation. A lower inner vessel temperature will have to be selected.
- 13) Allow the distillation to proceed until no more CF₃I remains.
- 14) Wait for the transfer line pressure to fall below 30psia, then move the hydraulic ram down to place the inner vessel near it's upper stop. Do not allow the hydraulic pressure to rise more than a few psi.
- 15) When the transfer line pressure stabilizes below 20psia, close MV-22 and isolate the transfer bottle.
- 16) Move the hydraulic ram up to bring the inner vessel to near neutral bellows.
- 17) Vent the transfer line and disconnect it from both the inner vessel and the transfer bottle. Cap the transfer bottle and the inner vessel port.
- 18) Ensure the "After Handling CF₃I" section of procedure 3 was followed. Wait 5 minutes then remove respirators and barricades.
- 19) Terminate data acquisition and backup the data by rsync'ing with the coupp2ls1 data disk.